Name:

at1124exam: Radicals and Squares (v902)

Question 1

Simplify the radical expressions.

$\sqrt{12}$ $\sqrt{18}$ $\sqrt{63}$

$\sqrt{2 \cdot 2 \cdot 3}$ $\sqrt{3 \cdot 3 \cdot 2}$ $\sqrt{3 \cdot 3 \cdot 7}$

$2\sqrt{3}$ $3\sqrt{2}$ $3\sqrt{7}$

Question 2

Find all solutions to the equation below:

$$2\left((x+4)^2 - 9\right) = 32$$

First, divide both sides by 2.

$$(x+4)^2 - 9 = 16$$

Then, add 9 to both sides.

$$(x+4)^2 = 25$$

Undo the squaring. Remember the plus-minus symbol.

$$x + 4 = \pm 5$$

Subtract 4 from both sides.

$$x = -4 \pm 5$$

So the two solutions are $x = 1$ and $x = -9$.

Question 3

By completing the square, find both solutions to the given equation. *You must show work for full credit!*

$$x^2 + 18x = -72$$

$$x^2 + 18x + 81 = -72 + 81$$
$$x^2 + 18x + 81 = 9$$
$$(x+9)^2 = 9$$
$$x + 9 = \pm 3$$
$$x = -9 \pm 3$$
$$x = -6 \quad \text{or} \quad x = -12$$

Question 4

Any quadratic function, with vertex at (h, k), can be expressed in vertex form:

$$y = a(x-h)^2 + k$$

A quadratic function is shown below in standard form.

$$y = 4x^2 - 24x + 28$$

Express the function in **vertex form** and identify the **location** of the vertex.

From the first two terms, factor out 4 .

$$y = 4(x^2 - 6x) + 28$$

We want a perfect square. Halve -6 and square the result to get 9 . Add and subtract that value inside the parentheses.

$$y = 4(x^2 - 6x + 9 - 9) + 28$$

Factor the perfect-square trinomial.

$$y = 4((x-3)^2 - 9) + 28$$

Distribute the 4.

$$y = 4(x-3)^2 - 36 + 28$$

Combine the constants to get **vertex form**:

$$y = 4(x-3)^2 - 8$$

The vertex is at point $(3, -8)$.